Directions in Large Systems Integration

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NOTES:

DIRECTIONS IN LARGE SYSTEMS INTEGRATION

- Define Overall SI Market
- Quantify Market
- Analyze Competitive Forces
- Market Direction

Market Dynamics . . .

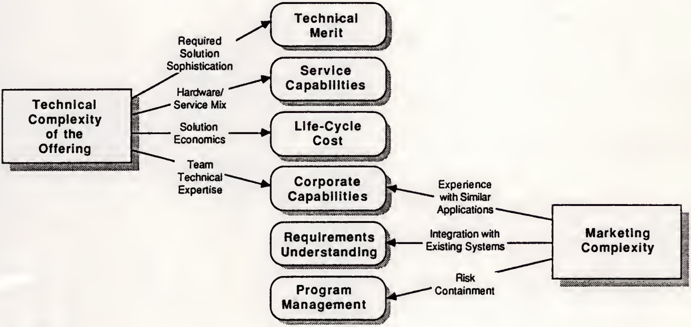
FEDERAL GOVERNMENT CUSTOMERS GENERALLY EVALUATE SOLUTIONS BASED ON SIX KEY CRITERIA

KEY SELECTION CRITERIA
SYSTEMS INTEGRATION CONTRACTS

Technical Merit	• Is the proposed solution feasible? • How well does it meet agency requirements?
Service Capabilities	• Does the solution provide adequate services to support implementation? • Are the services of sufficiently high quality?
Life-Cycle Cost	• Is the solution cost effective, both on an initial cost and on a systems life-cycle basis?
Requirements Understanding	• How well does the offeror understand the agency/organization, its functions, and needs? • Does the solution adequately deal with the required interfaces to existing agency systems and processes?
Program Management	• Is the proposed team capable of delivering on-time, within budget? • Will the proposed approach adequately contain program risks?
Corporate Capabilities	• Does the team have the right set of skills to get the job done? • Does the team have relevant experience?

THE VARYING REQUIREMENTS OF THESE CONTRACTS CAN BEST BE EXPLAINED BY TWO UNDERLYING DRIVERS

KEY CRITERIA



Technical Complexity of the Offering

Required Solution Sophistication → **Technical Merit**

Hardware/ Service Mix → **Service Capabilities**

Solution Economics → **Life-Cycle Cost**

Team Technical Expertise → **Corporate Capabilities**

Marketing Complexity

Experience with Similar Applications → **Corporate Capabilities**

Integration with Existing Systems → **Requirements Understanding**

Risk Containment → **Program Management**

THE TECHNICAL COMPLEXITY OF THE OFFERING INCREASES LARGELY AS THE DIFFICULTY OF INTEGRATION INCREASES

TECHNICAL COMPLEXITY

LOW:
"Off-the-Shelf"

- Minimal systems integration and engineering required
- Stand-alone products, such as departmental processors
- Services usually limited to maintenance training

MEDIUM
"Limited Integration"

- Some systems integration and engineering required
- Usually single-site
- Perhaps multiple vendors
- Some developmental services required; however, usually stand-alone applications

HIGH:
"Multivendor Multisite Integration"

- Significant integration with existing systems
- Usually new to the world application, requiring significant development
- Typically multisite, with networked communications
- Often in a multivendor environment
- Many external interface standards

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Market Dynamics . . .

THE NEED FOR AGENCY AWARENESS INCREASES AS THE REQUIRED BACKGROUND KNOWLEDGE BECOMES INCREASINGLY SPECIFIC TO THE EXACT ENVIRONMENT IN WHICH THE SYSTEM WILL OPERATE

MARKETING COMPLEXITY

MINIMAL – "Agency-Specific"	MODERATE – "Organization-Specific"	HIGH – "Application-Specific"
• General purpose products to be used throughout the agency • Standard user interface • Some knowledge of agency habits required	• Perhaps a unique solution • Specific knowledge of organization needs required • Usually some application-specific design elements	• A unique solution required • Limited number of users • Substantial interplay with existing data systems and organization

Market Dynamics . . .

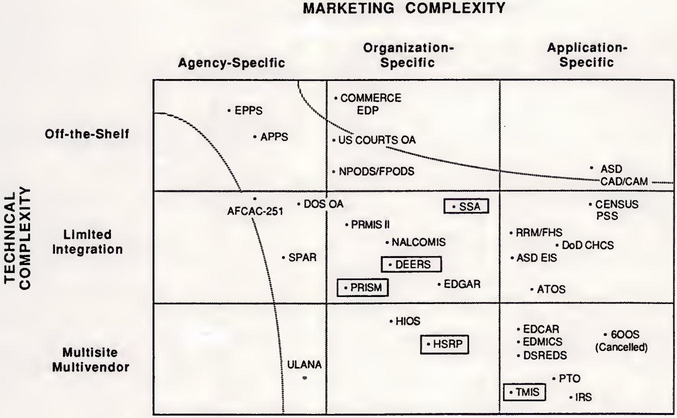
MAPPING THESE PROCUREMENTS AGAINST THESE UNDERLYING DRIVERS BEGINS TO EXPLAIN THE DIVERSITY OF THE MARKET

MARKETING COMPLEXITY

TECHNICAL COMPLEXITY	Agency Specific	Organization Specific	Application Specific
Off-the-Shelf			
Limited Integration		SSA DEERS PRISM	
Multisite Multivendor		HSRP	TMIS

Market Dynamics . . .

OTHER POTENTIAL INITIATIVES CAN BE POSITIONED SIMILARLY



	Agency-Specific	Organization-Specific	Application-Specific
Off-the-Shelf	• EPPS • APPS	• COMMERCE EDP • US COURTS OA • NPODS/FPODS	• ASD CAD/CAM
Limited Integration	• AFCAC-251 • DOS OA • SPAR	• SSA • PRMIS II • NALCOMIS • DEERS • PRISM • EDGAR	• CENSUS PSS • RRM/FHS • DoD CHCS • ASD EIS • ATOS
Multisite Multivendor	ULANA •	• HIOS • HSRP	• EDCAR • EDMICS • DSREDS • 6OOS (Cancelled) • PTO • TMIS • IRS

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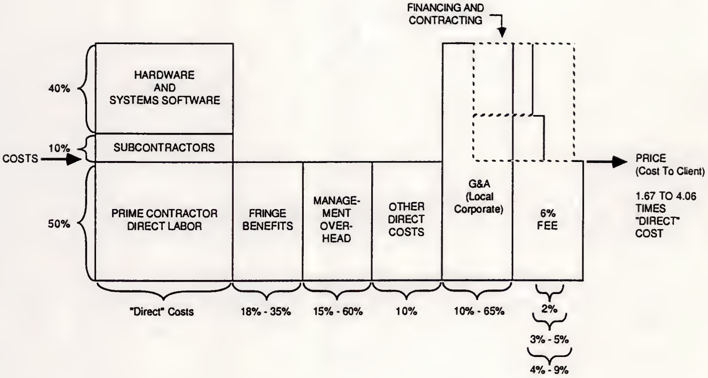
FINANCING AND CONTRACTING
40%
HARDWARE AND SYSTEMS SOFTWARE
10%
SUBCONTRACTORS
COSTS
50%
PRIME CONTRACTOR DIRECT LABOR
FRINGE BENEFITS
MANAGE-MENT OVER-HEAD
OTHER DIRECT COSTS
G&A (Local Corporate)
6% FEE
PRICE (Cost To Client)
1.67 TO 4.06 TIMES "DIRECT" COST
"Direct" Costs
18% - 35%
15% - 60%
10%
10% - 65%
2%
3% - 5%
4% - 9%

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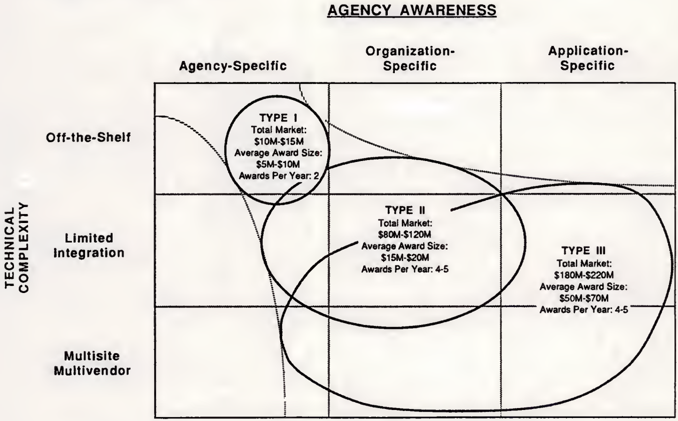
Market Dynamics . . .

THESE VARYING LEVELS OF CAPABILITIES BREAK THE MARKETING INTO THREE TYPES, EACH CHARACTERIZED BY DIFFERING LEVELS AND KINDS OF PROCUREMENT ACTIVITY



AGENCY AWARENESS

Agency-Specific

Organization-Specific

Application-Specific

TECHNICAL COMPLEXITY

Off-the-Shelf

Limited Integration

Multisite Multivendor

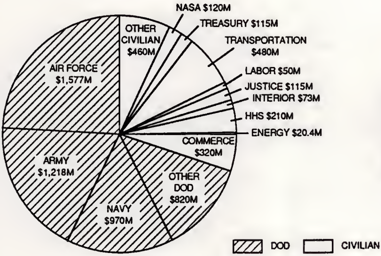
TYPE I
Total Market:
$10M-$15M
Average Award Size:
$5M-$10M
Awards Per Year: 2

TYPE II
Total Market:
$80M-$120M
Average Award Size:
$15M-$20M
Awards Per Year: 4-5

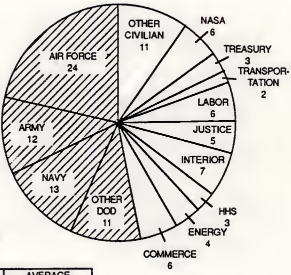
TYPE III
Total Market:
$180M-$220M
Average Award Size:
$50M-$70M
Awards Per Year: 4-5

THE PROCUREMENTS MAKING UP THE MARKET ARE HIGHLY DIVERSE — SOURCED FROM A WIDE RANGE OF FEDERAL AGENCIES

TOTAL AWARD VALUE ($M)
1982 - 1986

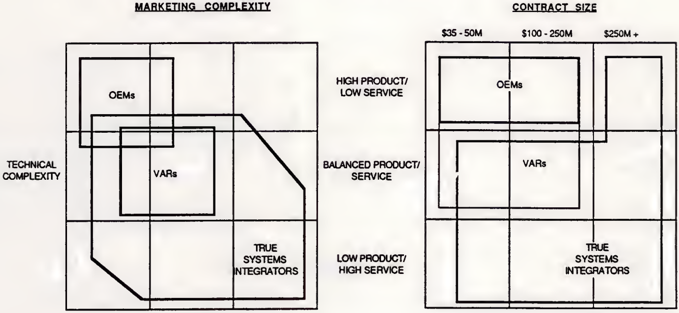


NUMBER OF AWARDS
1982 - 1986



	TOTAL AWARD VALUE	TOTAL NUMBER OF AWARDS	AVERAGE SIZE
DOD	$4,585M	60	$76M
CIVILIAN	$1,971M	53	$37M
TOTAL	$6,556M	113	$58M

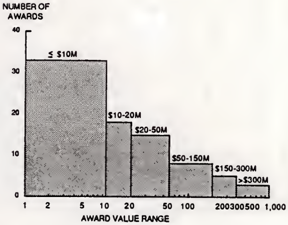
ZONES OF COMPETITIVE ADVANTAGE BY BUSINESS MODEL TYPE



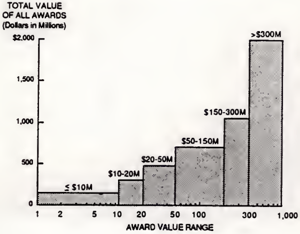
Market Dynamics . . .

. . . SPANNING THE RANGE FROM FAIRLY SMALL PROCUREMENTS TO VERY LARGE PROCUREMENTS

DISTRIBUTION OF SYSTEMS INTEGRATION AWARDS (1982 TO 1985)



DISTRIBUTION OF SYSTEMS INTEGRATION AWARD VALUES



Note: Excludes awards < $1 million in value. Total award value (dollars in millions).
Source: INPUT, Commerce Business Daily, Booz • Allen & Hamilton analysis

Market Dynamics . . .

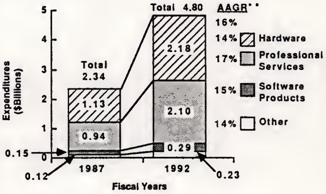
THE LARGE-SCALE FEDERAL SYSTEMS INTEGRATION MARKET IS CURRENTLY A $2.0 BILLION MARKET . . .

LARGE-SCALE FEDERAL SYSTEMS INTEGRATION MARKET*

FY 1982-1986

• Total Number of Awards	113
• Total $ Awards	$6.55B
• Average Award Size	$58M
• Total Average Annual Awards	$1.31B
• FY 86 Award Value	$1.6B

FY 1987-1992



** Average Annual Growth Rate

. . . AND IS EXPECTED TO GROW AT A 16-PERCENT ANNUAL RATE TO $4.8 BILLION IN 1992

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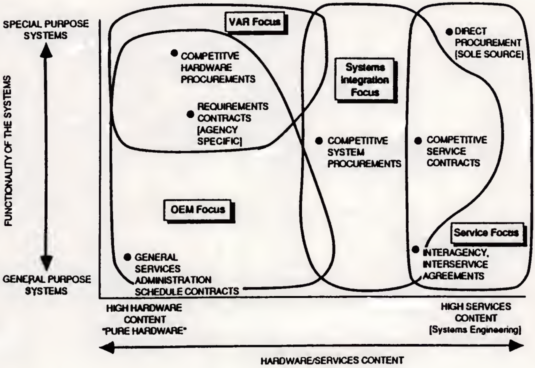
* Excludes procurements less than $1 million in award size.

Source: INPUT, Commerce Business Daily, Booz • Allen & Hamilton

Market Dynamics...

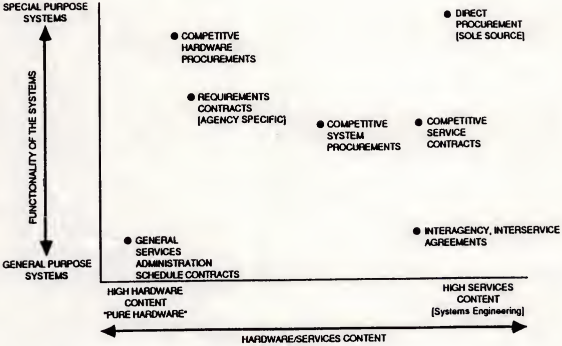
THE VARIOUS SUPPLIER GROUPS HAVE STAKED OUT DIFFERENT TERRITORIES WITHIN THIS MARKET



SPECIAL PURPOSE SYSTEMS
FUNCTIONALITY OF THE SYSTEMS
GENERAL PURPOSE SYSTEMS
VAR Focus
● COMPETITIVE HARDWARE PROCUREMENTS
● REQUIREMENTS CONTRACTS [AGENCY SPECIFIC]
OEM Focus
● GENERAL SERVICES ADMINISTRATION SCHEDULE CONTRACTS
Systems Integration Focus
● COMPETITIVE SYSTEM PROCUREMENTS
● DIRECT PROCUREMENT [SOLE SOURCE]
● COMPETITIVE SERVICE CONTRACTS
Service Focus
● INTERAGENCY, INTERSERVICE AGREEMENTS
HIGH HARDWARE CONTENT "PURE HARDWARE"
HIGH SERVICES CONTENT [Systems Engineering]
HARDWARE/SERVICES CONTENT

Market Dynamics...

...WHICH SERVE TO DIFFERENTIATE VARIOUS FEDERAL PROCUREMENT METHODS


SPECIAL PURPOSE SYSTEMS
FUNCTIONALITY OF THE SYSTEMS
GENERAL PURPOSE SYSTEMS
● COMPETITIVE HARDWARE PROCUREMENTS
● DIRECT PROCUREMENT [SOLE SOURCE]
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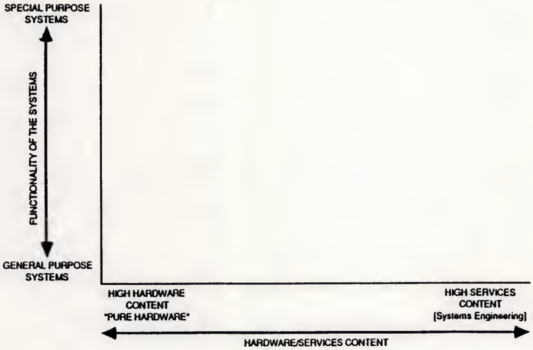
● COMPETITIVE SERVICE CONTRACTS
● INTERAGENCY, INTERSERVICE AGREEMENTS
● GENERAL SERVICES ADMINISTRATION SCHEDULE CONTRACTS
HIGH HARDWARE CONTENT "PURE HARDWARE"
HIGH SERVICES CONTENT [Systems Engineering]
HARDWARE/SERVICES CONTENT

Market Dynamics...

THE FEDERAL SYSTEMS MARKET CAN BE VIEWED ALONG TWO DIMENSIONS -- SYSTEM FUNCTIONALITY VERSUS HARDWARE/SERVICES CONTENT...


SPECIAL PURPOSE SYSTEMS
FUNCTIONALITY OF THE SYSTEMS
GENERAL PURPOSE SYSTEMS
HIGH HARDWARE CONTENT "PURE HARDWARE"
HIGH SERVICES CONTENT [Systems Engineering]
HARDWARE/SERVICES CONTENT

Market Dynamics . . .

VARYING CAPABILITIES ARE REQUIRED TO COMPETE IN EACH MARKET SEGMENT

AREA	FACTOR	TYPE I	TYPE II	TYPE III
TECHNICAL	Product Offering	• Specific product offerings • Mainframe and support services	• Family of compatible products requiring some external interfaces	• Full suite of product offerings usually requiring multiple vendors • Interfaces required with current and standard systems
	Technical Breadth	• Systems engineering and integration • Software engineering usually not required	• Some systems engineering and integration skills required • Software engineering and development usually required	• Systems engineering and integration skills required to accommodate multi-site environment typically involving computer network architectures • Wide range of software engineering required
	Program Management	• Minimal program management skills required	• Program management and support skills required to control software development and implementation process	• Strong program management and support organization required
MARKETING/ SELLING ORGANI-ZATION	Agency Relationship	• Broad agency understanding Familiarity with agency buying habits and processes	• Good understanding of specific organization needs and biases • Sufficient contact with technical buyers to establish credibility	• Intimate understanding of specific factors and applications • Working understanding and current systems environment and systems standards • Personal relationship with technical buyers
	Functional Expertise	• Broad understanding of agency functions and work processes	• Specific organization functional and applications expertise required	• Working understanding of existing applications and work flows • Strong understanding of current automated systems user interfaces
	Selling Resources/ Approach	• Broad product sales and services support • Sales coverage with agency buying authorities	• More technical sales force with both product and services understanding • Problem solving selling approach to users and technical representatives	• Large "expert" selling teams • Problem solving selling approach • Ability to demonstrate required expertise
	Teaming Relationship	• Direct contracting for secondary products or maintenance services if required	• Mix of hardware vendors and services contractors usually required • Can be non-exclusive	• Exclusive teaming arrangements for specific expertise • Mix of exclusive and non-exclusive products
CORPORATE RESOURCE	Financial/ Contract Administration	• Product focused contracting and pricing	• Product and services focused contracting and services • Software estimating and pricing often on fixed price basis	• Product and service focus • Hybrid contracting and pricing • Full life-cycle systems management pricing • Subcontract administration
	Facilities	• No unique requirements	• Access to benchmark facilities	• Benchmark facilities • Data centers for in-house development • Full systems management support skills
	Human Resources	• Product and maintenance support staff • Typically single site	• On-site development support staff • Program management teams	• Full systems management support skills • Multi-site support

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LEGISLATION	IMPACT ON THE PROCESS
PL 89-306 Brooks Act	• Strong centralized oversight Lengthened procurement lead time
PL 93-400 OFPP Act	• "Try before you buy" Greater contractor accountability through systems life cycle
PL 96-511 Paperwork Reduction Act	• Greater agency autonomy Even greater contractor accountability
PL 98-369 Competition In Contracts Act	• Virtually eliminated sole source/directed procurement Bundling requirements

EVOLVING AGENCY REQUIREMENTS

PAST	FUTURE	IMPLICATION
• Computing needs and communication needs considered separately, resulting in separate procurements	• Computing and communication requirements merging	• Vendors will have to respond to demand for comprehensive, integrated systems – technical breadth may be more important than depth
• Hardware, software services purchased separately • Significant system integration/ project management performed by the Government	• One contract covers system requirements definition, project management, systems integration, installation, and facilities management – including procurement of hardware and software	• Large vendors able to demonstrate project management and systems integration skills will be advantaged • Vendors must be savvy procurers and astute managers of large numbers of vendors of both products and services • Increased teaming will be required to meet broad mission needs and increase "comfort level" with customer • Niche products/services willl be subcontracted by larger, "overseer" primes
• "Best" solution required, cost trade-offs a secondary consideration	• Emphasis on price/performance, "adequate solution"	• Lower-cost providers advantaged • Technical prowess less important than management skills, cost control in many instances
• Relatively short-lived systems – complete replacement of older systems with new equipment	• Improvement/upgrade of existing systems in lieu of "design from scratch" when possible	• Increased follow-on work • Decreased "design"/"research" work
• Tasks or complete, detailed project specifications outlined in RFP	• Mission requirements or functional specifications only outlined in RFP	• Vendors must keep up with evolving products/technologies–best price/performance solutions must be developed before proposal preparation

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B. Scott McCord
Senior Associate
BOOZ, ALLEN & HAMILTON, INC.

B. Scott McCord, a senior associate at Booz, Allen & Hamilton Inc., received a B.S. degree in mathematics and applied science from the Naval Academy and an M.S. degree in computer science from the U.S. Naval Postgraduate School.

Mr. McCord has 10 years of professional experience in computer and communications systems, including local- and wide-area network analysis, software engineering and data base design, Department of Defense (DOD) and commercial data communications, computer system analysis and acquisition, information system design, software and hardware economic analysis, software quality assurance, system life cycle management, software development, quality assurance, and independent verification and validation (IV&V). Mr. McCord also has experience in more than 10 programming languages and data base management systems on mainframes, minicomputers, and microcomputers. Mr. McCord is familiar with the implementation of information systems in Air Force and other DoD environments, and the development of local-area network (LAN) and information standards.

At Booz, Allen, Mr. McCord is leading an 11-year, $30 million contract to implement an IBM 9370-based information system for the Marine Corps using Oracle and VM Center in worldwide SNA networks. The system will provide improved management capabilities for Marine Corps real-property assets at 16 major sites worldwide.

For the Worldwide Military Command and Control System Information System Joint Program Office, Mr. McCord led the design of a system to translate documents between incompatible word processors. The system was designed to translate documents between native formats through an interim format based on the Navy's document interchange format, implemented on a VAX 11/780 in Ada, and used through the Defense Data Network.

Previously, Mr. McCord led an analysis of the use of two electronic mail systems and their effects on productivity in the Defense Communications Agency (9DCA): a metropolitan-based system implemented on Wang VS systems using Mailway, and a worldwide system implemented on a BBN C/70 and attached to the Defense Data Network. The methodology was based on National Bureau of Standards Special Publication 500-72 and was transferred to and documented in a DCA pamphlet distributed to justify office automation needs.

For a European shipping company, Mr. McCord directed the preparation of a business system information plan, identification of missing strategic systems, recommendations for migration of an ADP equipment base, and development of a 5-year management information system plan.

For a regulated subsidiary of an independent telephone company, Mr. McCord supervised the development of standard procurement policies and procedures for the acquisition of commercial software products and development services to build internal systems. The assignment focused on a project management standard for large software development efforts.

Mr. McCord also led a requirements analysis of a computer research system for a large Wall Street firm to support the trading of fixed-income securities. The analysis included functional and performance requirements identification, communication requirements, architecture formulation, vendor evaluation, and short- and long-term planning.

Before joining Booz, Allen, Mr. McCord was a principal engineer at an engineering consulting firm where he provided program support and software quality assurance for the Air Force prototype jet engine diagnostic system of the Air Force Logistics Command. The prototype was implemented in FORTRAN on a PDP 11/70, with graphic displays to portray engine health, and communicated with a remote AMDAHL 470/V7. Program support included preparing input for program objective memoranda and life cycle management in accordance with DoD STD 7935.1 and Air Force regulations (AFRs) 300-12 and 300-15.

For the Air Logistics Center at San Antonio, Texas, Mr. McCord performed an economic analysis of computer and communication system alternatives to support the Air-Force-wide Nondestructive Inspection Program. This analysis was conducted in accordance with AFR 178-1 and AFP 178-8.

Mr. McCord supervised the technical aspects of many DoD projects, including:

- IV&V of the Electronic Warfare Automated Integration System Facility at the Warner Robins Air Logistics Center
- Requirements analysis of the Air Force Logistic Command's stock control and distribution system
- Interface control documents for the Air Force's comprehensive engine management system

- Analysis tools and risk analysis for acquisition programs at the Army's Troop Support and Readiness Command.

For Air Force Headquarters, Mr. McCord managed a project to improve the computer and communications support provided to headquarters staff. The project involved installing a broadband LAN, identifying communication and information processing standards and security features, and designing the general technical framework through which the LAN and attached devices were to be used. The automated data processing environment included mainframe and minicomputer systems such as IBM 3032s, VAX 11/780s, and Honeywell DPS 8-70s; workstations; and gateway requirements to wide-area networks such as MILNET and AUTODIN. Mr. McCord also contributed to the related development of the Unified LAN Architecture (ULANA). Booz, Allen developed standard LAN components specifications for ULANA to use throughout the Air Force.

Previously, Mr. McCord served in the Marine Corps in the infantry, in reconnaissance, and with data systems. Mr. McCord was also a primary system analyst at, Marine Corps Headquarters, where he evolved systems for the logistic community. He analyzed data communication requirements for developing logistic systems, managed system life cycles, designed data bases, and specified computer and communications hardware and software for acquisition.

Mr. McCord is a member of the Association for Computing Machinery (ACM), several ACM special-sinterest groups, the Institute of Electrical and Electronics Engineers, and the Armed Forces Communications and Electronics Association. He holds a Top Secret security clearance.